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Title Mathematical Formulations for Infrared Signature Reduction

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Abstract

In the context of IR signatures of aircraft, the sources that are responsible for IR signatures are solid bodies and hot exhaust gases. Mathematical expressions to predict radiation characteristics of solid substances are derived using electromagnetic theory. The emissivity and reflectivity of substances are obtained in terms of optical parameters of materials. The estimation of radiation emissions from gases requires knowledge of radiation propagation transfer in gaseous medium. Therefore, radiative transfer equation in absorbing, scattering and emitting media is described. Finally, Kramers-Kronig analysis is introduced to obtain optical parameters from measured values of reflectivity and absorptivity.